



PATENT  
Customer No. 22,852  
Attorney Docket No. 05999.0091-00

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:	)	
	)	
Marco NAHMIAS NANNI et al.	)	Group Art Unit: 1713
	)	
Application No.: 09/878,405	)	Examiner: Peter D. Mulcahy
	)	
Filed: June 12, 2001	)	
	)	
For: PROCESS FOR PRODUCING	)	Confirmation No.: 2314
TYRES, TYRES THUS OBTAINED	)	
AND ELASTOMERIC	)	
COMPOSITIONS USED THEREIN	)	

**Attention: Mail Stop Appeal Brief-Patents**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

**REPLY BRIEF UNDER 37 C.F.R. § 41.41**

Pursuant to 37 C.F.R. § 41.41, Appellants submit this Reply Brief in response to the Examiner's Answer mailed July 19, 2005. A Request for Oral Hearing is being filed concurrently with this Reply Brief.

Appellants do not believe that a fee is due in connection with the filing of this paper. However, if there are any fees due in connection with the filing of this Reply Brief, which are not enclosed herewith, please charge such fees to our Deposit Account No. 06-0916.

**I. Grounds of Rejection to be Reviewed on Appeal**

In the Examiner's Answer, the Examiner maintains his obviousness rejection of claims 55-60 and 62-107 as unpatentable under 35 U.S.C. § 103(a) over Varughese et al., *Chemical Attraction Between Expoxidized Natural Rubber and Silica: Studies on Cure Characteristics and Low Temperature Dynamic Mechanical Properties*, Journal of Applied Polymer Science, Vol. 44, pp.1847-1855 (1992) ("Varughese"), or over Japanese Patent Abstract 07-090123 ("JP 07-090123") (collectively, "the References").

Appellants disagree with the rejection and submit that, for at least the reasons set forth in the Appeal Brief and in this Reply Brief, a *prima facie* case of obviousness under 35 U.S.C. § 103(a) has not been established by the Examiner.

**II. Response to the Examiner's Answer Regarding Grounds of Rejection**

Appellants request that the Board reverse the final rejection of claims 55-60 and 62-107, because the claims are not obvious over the cited prior art. In particular, the Examiner has failed to meet his burden to establish a *prima facie* case of obviousness with respect to any of the cited prior art.

**A. "Crosslinkable elastomeric material has an effective degree of crosslinking equal to at least 65% after no more than 5 minutes of heating at 170 °C"**

- 1. The Examiner has not shown how the prior art teaches or suggests a composition meeting this crosslinking limitation, as required by claims 55-60, 62-92, and 107.**

Appellants maintain that neither Varughese nor JP 07-090123 expressly or inherently teaches or suggests the claim limitation: "crosslinkable elastomeric material

has an effective degree of crosslinking equal to at least 65% after no more than 5 minutes of heating at 170 °C.” See M.P.E.P. § 2143.03. The Examiner has admitted that neither reference expressly discloses this limitation, by arguing “that each of the composition limitations are met and there is no reason to believe that the claimed invention would not possess properties which would anticipate or render obvious the property.” *Answer* at page 4. The Examiner fails to provide, however, any explanation, evidence, or even a plausible reasoning as to how simply meeting the composition limitations results in an effective degree of crosslinking equal to at least 65%.

The Examiner has relied upon *In re Fitzgerald*, 205 U.S.P.Q. 594, 596 (C.C.P.A. 1980); however, in contrast to *In re Fitzgerald*, the limitation at issue does not render these claims as product-by-process claims. Rather, they are true process claims and true product claims that identify a physical property of one of the components, just as if they had claimed the tensile strength of a component. Even assuming *arguendo* that some claims are product-by-process claims, the Examiner has provided no basis for the conclusion that “the prior art discloses a product which reasonably appears to be either identical with or only slightly different than a product claims.” *In re Fitzgerald*, 205 U.S.P.Q. at 596. The presumption that merely meeting composition limitations results in a product meeting the effective degree of crosslinking limitation is false, particularly in light of the evidence of record that shows the property limitation is not merely a function of the composition’s components. For example, by using Varughese’s own test data, Appellants have shown that crosslinking property limitation is not inherent. See pages 4–10 of this Reply.

When this is the case, it is proper to distinguish the prior art based on the property limitation. For example, the Federal Circuit has indicated that “[o]n occasion, particularly with polymers, structure alone may be inadequate to define the invention, making it appropriate to define the invention in part by property limitations.” *E.I. Du Pont de Nemours & Co. v. Phillips Petroleum Co.*, 7 U.S.P.Q.2d 1129, 1133 (Fed. Cir. 1988).

Appellants maintain that the evidence of record establishes that the mere fact that a reference may disclose a raw tire that “comprises at least one crosslinkable elastomeric material comprising an elastomeric polymer containing epoxide groups and an active filler containing hydroxyl groups dispersed in the elastomeric polymer,” does not mean that the “at least one crosslinkable elastomeric material has an effective degree of crosslinking equal to at least 65% after no more than 5 minutes of heating at 170 °C” limitation is inherently met. *See In re Robertson*, 49 U.S.P.Q.2d 1949, 1950-51 (Fed. Cir. 1999) (reversing the Board’s finding of inherency because there was no evidence that the disclosed system necessarily encompassed the missing limitation). Inherency cannot be established when the evidence merely shows that the property, under certain circumstances, can be present. *Id.*; *see also*, M.P.E.P. § 2112. Accordingly, the burden has not shifted to Appellants to disprove the Examiner’s assertions. Nevertheless, Appellants submit that the evidence of record, as presented in the Appeal Brief and as presented below, establishes (1) that the property limitation is not inherent and (2) that the compositions of the References fail to meet the limitation.

First, the Examiner has failed to address that the evidence of record establishes that the Examiner’s assumption (composition defines properties) is incorrect. The

effective degree of crosslinking is a function of not only the amount of recited material, but of time, temperature, and other materials. See *e.g.*, *Specification* at pp. 22-23.

Only under certain conditions may the effective degree of crosslinking be achieved.

Yet, nothing in either Varughese or JP 07-090123 suggests that these factors are taken into account. Under these uncontested facts, cross-linking cannot be deemed to be an inherently disclosed property. See M.P.E.P. § 2112 (discussing that inherency cannot be based on what would result if conditions were optimized).

Second, Varughese's admits that a person or ordinary skill in the art cannot achieve the crosslinking property limitation merely with the recited materials.

Specifically, Varughese discloses that "[g]enerally, the interaction between a filler and a polymer are not high enough so that cross-linking can be detected through a rheometer torque rise." (*Varughese* at p. 1849). In response, the Examiner has argued that "the point of the disclosure is to report the increase in crosslinking between the active filler and the epoxy rubber" and that it would be "reasonable to expect this increase in crosslinking to render obvious or anticipate the 'degree of crosslinking' limitation."

*Answer* at 6. Appellants disagree with the Examiner's reasoning.

Although Varughese states that "comparatively good number of cross-links (considerable rise in rheometric torque, nonsticky and transparent vulcanizates) are present in the silica-filled vulcanizates even in the absence of any conventional curing agents" (*Varughese* at p. 1849), it does not disclose a composition that meets the claim limitation of having "at least one crosslinkable elastomeric material has an effective degree of crosslinking equal to at least 65% after no more than 5 minutes of heating at 170 °C," as discussed in detail below and in the *Specification* at pp. 3-4. Rather,

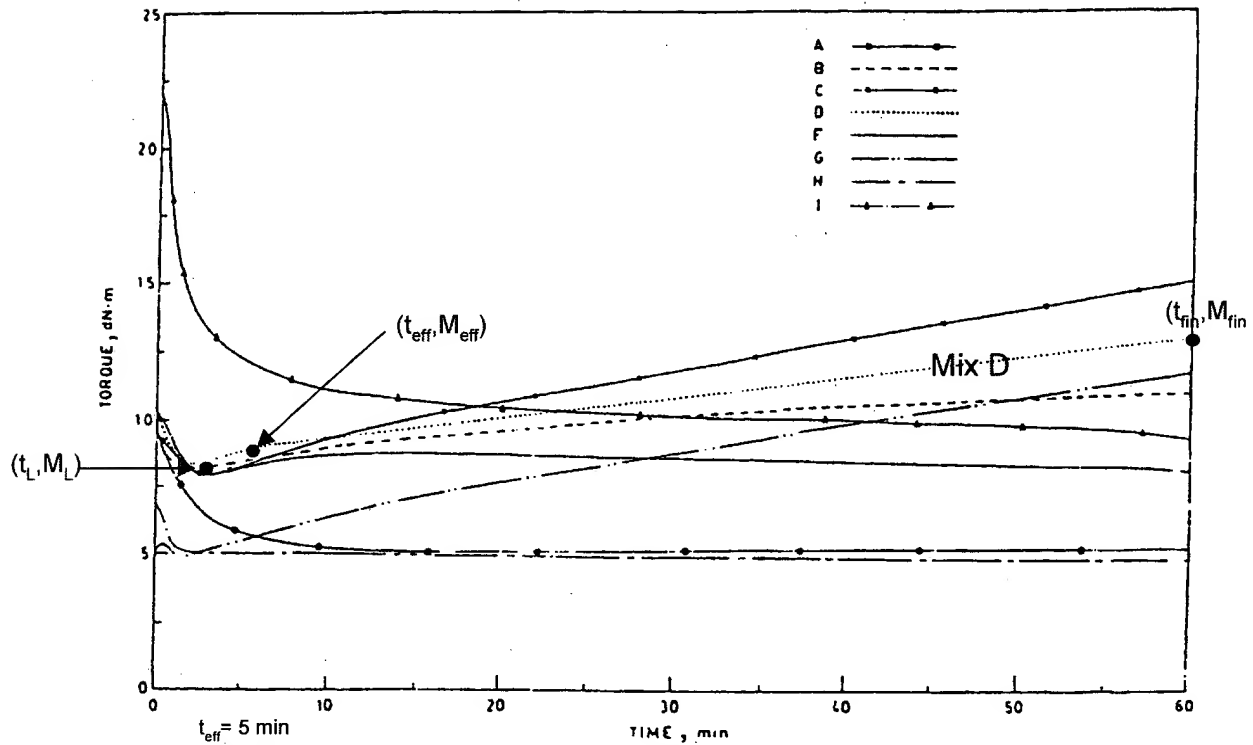
Varughese merely suggests that silica-filled vulcanizates have a good number of cross-links when compared with the other compositions. Varughese states “[h]ere, the heating of the mixes should be treated separately from the vulcanization of samples. Usually vulcanization is done for a much shorter period and at a lower temperature. This indicates that for the cross-linking to take place between the epoxy and silanol groups a higher activation energy is required. Hence, while considering the reinforcement characteristics of conventionally cured silica-filled vulcanizates, it should be taken into account that the chemical interaction under such conditions is comparatively poor.” (emphasis added) (*Varughese* at p. 1849). A fair reading of this disclosure confirms that even by working at very extreme conditions (180 °C, for 1h) that are unacceptable in a large-scale production, Varughese failed to achieve a degree of crosslinking equal to at least 65%, which is typically required to a vulcanization step.

Accordingly, the general conclusion that “the interaction between a filler and a polymer are not high enough so that cross-linking can be detected through a rheometer torque rise” (which is the source of data for the property limitation), still remains true.

Third, the Examiner inadequately addresses Appellants’ own testing as shown by Comparative Examples 13 and 14 of Appellants’ Table 4. The Examiner has asserted that the intended use of this data was to show the importance of the amount of silica filler and that “Varughese disclosure only uses carbon black in minor amounts relative to silica.” *Answer* at 7. That argument only further supports Appellants’ position. As explained below, despite using relatively small amounts of carbon black, the compositions of Varughese do not achieve the effective degree of crosslinking required by the claims.

The fourth piece of evidence showing that crosslinking claim limitation is not inherent to a composition is Varughese's own test data. Here, the Examiner merely asserts with no explanation that "[t]hese estimations are of no probative value. There is no rationale as to how these values have been calculated." *Answer* at 6. Appellants have repeatedly explained, however, that specification provides the necessary information to take the data provided by Varughese to determine whether Varughese's compositions meet the crosslinking limitation. This evidence is highly probative because it shows (1) that compositions meeting the composition limitations do not inherently meet the crosslinking property limitation, and (2) that the compositions of Varughese in particular fail to meet this crosslinking property limitation.

As detailed at pages 9-10, the effective degree of crosslinking ( $R_{eff}$ ) can be determined from an MDR (Moving Die Rheometer) rheometric curve. Varughese's Figure 1, below, is comparable to Figure 2 of Appellants' Specification and it is possible to determine the effective degree of crosslinking for each of the plotted mixtures. Even though Varughese does not address a method for determining the effective degree of crosslinking, it does provide the data to facilitate the calculation.



**Figure 1** Effect of heating of silica-filled ENR-50 mixes. rheometer curves at 180°C.

As previously explained to calculate the effective degree of crosslinking for Varughese's Mix D, for example, Appellants use Equation 1, on page 8 of the specification,

$$\%R_{eff} = \frac{M_{eff} - M_L}{M_{fin} - M_L} * 100 \quad (1).$$

As indicated in Figure 1 (see Varughese at page 1849, Figure 1) above, the minimum torque value ( $M_L$ ) and the final torque value ( $M_{fin}$ ) can be obtained directly from Varughese's Figure 1 and are as follows:

$$(t_{ML}; M_L) = (3.8 \text{ min}; 8.3 \text{ dNm}),$$

$$(t_{fin}; M_{fin}) = (60 \text{ min}; 13 \text{ dNm}).$$



The effective torque ( $M_{eff}$ ) was estimated from Figure 1, as the torque resulting after 5 minutes of heating, so as to calculate the corresponding effective degree of cross-linking after no more than five minutes of heating, and it is as follows:

$$(t_{eff}; M_{fin}) = (5 \text{ min}; 8.6 \text{ dNm}).$$

Accordingly, the effective degree of cross-linking after no more than five minutes for Mix D is 6%.

$$\%R_{eff} = \frac{M_{eff} - M_L}{M_{fin} - M_L} * 100 + \frac{8.6 - 8.3}{13 - 8.3} * 100 = 6\%.$$

As reflected in the record, Appellants have been able to calculate the effective degree of crosslinking after no more than 5 minutes of heating at 180 °C for each mixture reported by Varughese that does not contain additional crosslinking agents, as required by the claims. Based upon the data provided by Varughese in Figure 1, the Mix F is estimated at 20%, of Mix H is estimated at 0% (no crosslinking), of Mix I is estimated at 10%.

The Examiner rejected these calculations as being mere estimates. These calculations are only “estimates” to the extent that Varughese’s data was collected at 180 °C, rather than the 170 °C of the claim limitation. However, since increased crosslinking is typically expected with higher temperatures, a person of ordinary skill in the art could reasonably conclude that the calculated effective degree of crosslinking values should be higher than if the data had been collected at 170 °C. Thus, Varughese’s compositions are expected to have an effective degree of crosslinking after no more than 5 minutes of heating at 170 °C that is worse than what is reported above.

Furthermore, even without making these calculations, a person of ordinary skill in the art would recognize that the shapes of the plotted curves in Figure 1 also provide information regarding whether crosslinking is happening. For example, the curve shapes plotted in Varughese's Figure 1 indicate that:

- Mixes C, D, and G fail to reach equilibrium or a maximum torque for the indicated time span. A lack of plateau generally indicates that the cured rubber composition fails to reach stability or adequate control; and
- Mixes A, F, H, and I fail to demonstrate any significant torque.

Thus, the fact that the compositions disclosed in Varughese, and plotted in Figure 1, fail to meet the claim limitation of having an effective degree of crosslinking equal to at least 65% establishes that both Varughese's and JP 07-090123's mere combination of at least one crosslinkable elastomeric material comprising an elastomeric polymer containing epoxide groups and an active filler containing hydroxyl groups dispersed in the elastomeric polymer does not inherently yield a composition with the required degree of cross-linking. Such a property is at best merely a possibility under the conditions taught by Varughese and JP 07-090123. Appellants note that having the limitation be merely a possibility is insufficient to establish inherency. See M.P.E.P. § 2143.03.

Accordingly, Appellants submit that Varughese's and JP 07-090123's mere disclosure of at least one crosslinkable elastomeric material comprising an elastomeric polymer containing epoxide groups and an active filler containing hydroxyl groups dispersed in the elastomeric polymer is insufficient evidence of a composition meeting the crosslinking limitation, which is not an inherent property of such a composition.

Thus, for this reason alone the rejection of claims 55-60, 62-92, and 107 under 35 U.S.C. § 103(a) is erroneous and should be reversed.

**2. The Examiner has not shown how the prior art teaches or suggests a motivation to modify the references nor a reasonable expectation of success for such a modification.**

The Examiner has not addressed in any manner Appellants' arguments that the rejection should be reversed because the evidence of record establishes neither a motivation for a person of ordinary skill in the art to modify the references to meet the effective degree of crosslinking limitation nor a reasonable expectation of success for the requisite modification of the references for the reasons detailed on pages 20-22 of the Appeal Brief, which is incorporated herein by reference.

Thus, for this reason alone the rejection of claims 55-60, 62-92, and 107 under 35 U.S.C. § 103(a) should be reversed.

**B. Claims 93 -101 Require "a Degree of Dispersion of the Active Filler Greater Than 90%, . . . at a Predetermined Temperature, to Avoid Pre-Crosslinking of the Elastomeric Composition," and Claims 102-106 Require that "the Active Filler is Dispersed in the Elastomeric Polymer . . . with a Dispersion Index Greater than 90%."**

Appellants maintain that neither Varughese nor JP 07-09123 teach or suggest, at a minimum, either dispersion limitations, as found in independent Claims 93, 102, and 103. Again, neither reference recognizes Appellants' claimed dispersion limits and/or the need to avoid pre-crosslinking of the elastomeric composition. The Examiner's entire argument relies on the fact that the references are silent regarding the degree of dispersion in their composition. The Examiner argues that because "the art does show the same active filler mixed with the same rubber components in the same amount

under the same conditions. . . it would share the same dispersion index.” *Answer* at page 5; see also page 7.

Appellants respectfully disagree. In addition to the fact that the Examiner has failed to establish that the same conditions are even taught, the Examiner has failed to address the fact that the evidence of record actually discloses that the prior art compositions are not expected to meet the claimed dispersion index limitation.

For example, the Examiner continues not to address the fact that while *JP 07-09123* may not discuss the dispersion index per se, it does disclose that epoxidized natural rubber (ENR) reacts with silica and that the silica filler does not disperse well in ENR/SBR systems. *JP 07-090123* at page 3, ll. 30-34. It further discloses that the filler disperses well only in the presence of natural rubber (NR). *Id.* Varughese simply mixes the silica filler and is silent regarding the dispersive qualities of the filler. *Varughese* at page 1848. Varughese, however, also uses ENR in which silica does not disperse well according to *JP07-09123*. Thus, a person of ordinary skill in the art reading the prior art would not expect a composition that meets the claimed dispersion index.

Moreover, the Examiner continues not to address the fact that, as evidenced in *JP 07-09123* and Appellants’ specification, neither dispersion limitation is inherent to a disclosure of the combination of elastomer and filler. For example, Appellants’ Comparative Example 9 in Table 3, which does not meet the dispersion requirement despite meeting the other limitations, resulted in a crosslinked product with poor tensile strength properties. See *Specification* at p. 28, Table 3. *JP 07-090123* at page 3, ll. 30-34.

Finally, since Varughese does not recognize either of these limitations, and *JP 07-09123* only teaches the use of NR to disperse the filler, the references cannot be deemed to provide the necessary motivation to modify their teachings. See M.P.E.P. § 2143.01. Only Appellants' specification provides that information, but that is not available to the Examiner to use to meet his burden with respect to an obviousness rejection. See M.P.E.P. § 2145.X.A.

Accordingly, Appellants submit that the rejection of independent claims 93, 102, 107, and their respective dependent claims, under 35 U.S.C. § 103(a) is erroneous and should be reversed.

**C. Claims 55, 62, 93, 102, 103, and 107 Require the composition be crosslinkable essentially without additional crosslinking agents**

**1. The Rejection Should be Reversed Because *JP 07-090123* Does not Teach or Suggest the Without Additional Crosslinking Agents Limitation.**

Appellants not only maintain that neither Varughese nor JP 07-09123 expressly teach or suggest the claim limitation: "crosslinkable elastomeric material has an effective degree of crosslinking equal to at least 65% after no more than 5 minutes of heating at 170 °C," but also maintain that Varughese and JP 07-09123 fail to teaches or suggests the claim limitation of "being crosslinkable essentially without additional crosslinking agents."

The Examiner argues that "[t]he claims are obvious from this teaching because the limitation 'essentially without additional crosslinking agents' is seen to have a degree of flexibility" and that the "amounts of curing agents suggested in the are low enough so as to fall within the scope of 'essentially without'." *Answer* at page 5. This is

an incorrect statement. Appellants defined the expression “essentially without additional crosslinking agents” to mean that “the crosslinkable composition is not subjected to the action of other systems capable of bringing about the crosslinking, or else that other products which may be present in the composition can in themselves participate in the crosslinking reaction, but are used in amounts less than the minimum amount required to obtain an appreciable degree of crosslinking in short times (for example within 5 minutes).” *Specification* at p. 7, l. 27 to p. 8, l. 7.

Accordingly, the compositions according to the present invention are crosslinkable essentially without any of the crosslinking systems generally used in the art, for example, sulfur or sulfur donors, peroxides or other radical initiators, and in the absence of high-energy radiation, such as UV, gamma rays, and the like, so as to induce crosslinking phenomena in the polymer. *Id.*, at 8, ll. 7-15. Appellants note this definition excludes the presence of any other crosslinking agents capable of causing crosslinking, or if there are any presents, it is in an amount so low the they can not contribute an appreciable degree of crosslinking in short times. One of ordinary skilled in the art would clearly know what is meant by “less than the minimum amount required to obtain an appreciable degree of crosslinking in short times.

The failure of the prior art to recognize this limitation is highlighted, for example, by all of the compositions disclosed in *JP 07-090123* which are cured with conventional sulfur-based vulcanizing systems. *JP 07-090123* at p. 5, ll. 21-29; *id.* at pp. 7-8, Table 1. *JP 07-090123* discloses that the sulfur content is preferably no less than 1.2 parts by weight, and more preferably from 1.5 to 3.0 parts by weight, per 100 parts by weight of rubber component. *Id.* at 5, ll. 28-29. As indicated in Table 1, page 7, the base

composition of JP 07-090123 includes 0.7 phr curing promoter and 1.7 phr sulfur. *Id.* at 7-8, Table 1. This is expressly contrary to the claim requirement that the “crosslinking step is carried out essentially without additional crosslinking agents.” See *Specification* at p. 7, l. 27 to p. 8, l. 7.

Accordingly, Appellants submit that the rejection of independent claims 55, 62, 93, 102, 103, and 107, and their respective dependent claims, under 35 U.S.C. § 103(a) is erroneous and should be reversed.


### III. Conclusion

For the reasons given above, and because the Examiner has failed to meet his burden of establishing a *prima facie* case of obviousness, pending claims 55-60 and 62-107 are allowable and reversal of the Examiner’s rejection is respectfully requested. The Board of Patent Appeals and Interferences should therefore reverse or dismiss the outstanding rejection and allow claims 55-60 and 62-107.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,  
GARRETT & DUNNER, L.L.P.

Dated: September 19, 2005

By:   
Anthony A. Hartmann  
Reg. No. 43,662